Quiz B: 8/9/16 Name Key

All Bad Choices (ABC) Inc. is considering building a new factory that will require an investment of $150 million today and $100 million a year from today. ABC expects that the new factory will produce its first cash flow two years from today. ABC expects this first cash flow to range between $10 and $50 million with an expected value of $35 million per year through 20 years from today. If cash flows are lower than expected, the factory can be sold any time over the next five years for $95 million. And if cash flow are greater than expected, the factory can be expanded any time over the next three years at a cost of $125 million. ABC expects that the expansion would generate cash flows between $5 million and $25 million with an expected cash flow of $20 million per year through 20 years from today. The standard deviation of returns on the new factory equals 35% over its entire life, 40% over the next five years, and 45% over the next three years. The standard deviation of returns on the expansion equals 50% over the life of the expansion, 60% over the next five years, and 65% over the next three years. The risk-free rate varies by maturity to maturity as follows: 1 = 0.56%; 2 = 0.72%; 3 = 0.86%; 5 = 1.13%; 7 = 1.41%; 10 = 1.59%; 20 = 1.91%; 30 = 2.32%. The cost of capital equals 10% for the project and 13% for the expansion.

How does the possibility of expanding the factory if sales are greater than expected affect the value of the new plant? Note: You only need to set up all the necessary equations and plug in all the variables. You don't have to solve anything.

+5 $C = S(N(d_1)) - PV(K)(N(d_2))$

+5 $S = \left(\frac{20}{.13}\right)\left(1 - \left(\frac{1}{1.13}\right)^{17}\right)\left(\frac{1}{1.13}\right)^{3}$ (+2, +2, +3, +3)

+5 $d_1 = \frac{\ln\left(\frac{S}{PV(K)}\right)}{\sigma\sqrt{T}} + \frac{\sigma\sqrt{T}}{2}$

+5 $d_2 = d_1 - \sigma\sqrt{T}$

+5 $PV(K) = \frac{125}{(1.0086)^3}$ +5 (+10, +10)

$\sigma = .65$ +10

$T = 3$ +5

Look up $N(d_1)$ & $N(d_2)$ on table or using Excel